

SUBSTITUTE FORM PTO-1390

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

ATTORNEY'S DOCKET NUMBER
12758-026001

U.S. APPLICATION NO. (If Known, see 37 CFR 1.5)
09/856424

INTERNATIONAL APPLICATION NO.
PCT/DE99/03742

INTERNATIONAL FILING DATE
25 November 1999

PRIORITY DATE CLAIMED
30 November 1998

TITLE OF INVENTION

COMMUNICATIONS METHOD AND SYSTEM FOR TRANSMITTING DATA VIA PHYSICAL CHANNELS WHICH ARE USED IN COMMON

APPLICANT(S) FOR DO/EO/US

Michael Benz, Anja Klein, Armin Sitte, Thomas Ulrich, Reinhard Köhn, Krause Jörn, Enric Mitjana, Christian Menzel and Christoph Mecklenbräuer

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
 2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
 3. ☐ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
 4. ☐ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
 5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
 6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
 8. ☐ An English language translation of amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
 9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
 10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11 to 16 below concern other documents or information included:**
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
 12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
 13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
 14. ☐ A substitute specification.
 15. ☐ A change of power of attorney and/or address letter.
 16. ☒ Other items or information:
 - ☒ English translation of International Search Report
 - ☐
 - ☐
 - ☐
 - ☐

CERTIFICATE OF MAILING BY EXPRESS MAIL

Express Mail Label No **EL694850521US**

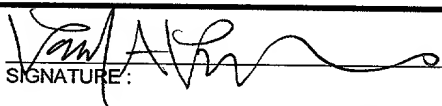
I hereby certify under 37 CFR §1.10 that this correspondence is being deposited with the United States Postal Service as Express Mail Post Office to Addressee with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, Washington, D.C. 20231

Date of Deposit

Signature

Typed Name of
Person Signing

May 21, 2001 *Samantha Bell* *Samantha Bell*

U.S. APPLICATION NO. (IF KNOWN) 09/856424		INTERNATIONAL APPLICATION NO. PCT/DE99/03742		ATTORNEY'S DOCKET NUMBER 12758-026001	
17. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS PTO USE ONLY	
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1000 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$860 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$710 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$690 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100 ENTER APPROPRIATE BASIC FEE AMOUNT =					
Surcharge of \$130 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).					
Claims	Number Filed	Number Extra	Rate		
Total Claims	10 - 20 =	0	x \$18	\$0.00	
Independent Claims	2 - 3 =	0	x \$80	\$0.00	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ \$270	\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$860.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$0.00	
SUBTOTAL =				\$860.00	
Processing fee of \$130 for furnishing the English Translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))				\$0.00	
TOTAL NATIONAL FEE =				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$0.00	
TOTAL FEES ENCLOSED =				\$860.00	
				Amount to be refunded:	\$
				Charged:	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$860.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. 06-1050 in the amount of \$0.00 to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 06-1050. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO:					
Paul A. Pysher FISH & RICHARDSON P.C. 225 Franklin Street Boston, MA 02110-2804 (617) 542-5070 phone (617) 542-8906 facsimile			SIGNATURE:  NAME: Paul A. Pysher REGISTRATION NUMBER: 40,780		

3/PRT3

09/856424

JCO3 Rec'd PST/FTL 21 MAY 2001

GR 98 P 5843

Description

Method and communication system for transmitting data
for a combination of a plurality of services via
5 jointly used physical channels

The invention relates to a method and a communication
system for transmitting data for a combination of a
plurality of services via jointly used physical
10 channels, in particular in mobile radio systems having
broadband radio channels.

A communication system provides one or more physical
transmission channels for transmitting data between a
15 data source and a data sink. The transmission channels
may be of a wide variety of types, e.g. for cable-
conducted transmission using electrical or optical
signals or for radio transmission via a radio interface
using electromagnetic waves. The text below concerns
20 radio transmission, in particular.

Radio transmission is used in mobile radio systems in
order to set up a connection to nonstationary
subscriber terminals. A mobile station in a mobile
25 radio system is such a nonstationary subscriber
terminal. Within the network coverage, the mobile
station can request a connection from any desired
locations, or a connection can be set up to the mobile
station. The most common mobile radio system is GSM
30 (global system for mobile communications), which was
developed for a single service, for voice transmission
purposes. The data rate of this service was assumed to
be constant. The GSM mobile radio system is called a
2nd generation system.

35

By contrast, the successive mobile radio generation,
the 3rd mobile radio generation, which is currently
being standardized in Europe under the name UMTS
(Universal System for Mobile Communications),

has provision for a plurality of services, which are to be transmitted within a transmission protocol.

The standardization documents ETSI SMG2/UMTS L23 expert group, Tdoc SMG2 UMTS-23 257/98, dated 10.6.1998, Tdoc SMG2 508/98 and Tdoc SMG2 515/98, dated 11.16.1998, give an overview of the present state of development of standardization and, in particular, an overview of the requirements in terms of how a transmission protocol can support the transport of data for a plurality of services.

The use of a common physical channel for transmitting data for a plurality of services presupposes that a unique mapping specification indicates the allocation of the services to different segments of the physical channel. By way of example, a physical channel is defined by a frequency band, a spread code (CDMA code division multiple access) and, if appropriate, a time slot within a frame.

The following terms are used to describe the mapping specification:

Transport format (TF):

A transport format defines a data rate, a coding, scrambling (interleaving), a data rate adjustment by puncturing and an error protection specification for a transport channel for a service.

Transport Format Set (TFS):

This denotes a set of possible transport formats which are permitted for a specific service.

Transport Format Combination (TFC):

This term indicates a possible combination of the transport formats for the various services which are mapped onto a common physical channel.

Transport Format Combination Set (TFCS):

This denotes a set of possible TFCs as a subset of all TFCs which are permitted for a specific connection.

5 Transport Format Combination Identifier (TFCI):

This information item indicates the currently used combination of the transport formats within the TFCs.

10 Examples relating to the transport formats can be found in ETSI SMG2/UMTS L23 expert group, Tdoc SMG2 UMTS-23 257/98, dated 10.6.98, pp. 14-16.

15 In order to be able to select the currently used combination of the transport formats for the various services in line with requirements, the TFC needs to be able to be changed and hence the TFCI needs to be signaled regularly. This signaling ties up transmission capacity, however. The greater the number of possible combination options (TFCS), the more capacity is
20 required for signaling.

The invention is based on the object of specifying a method and a communication system which reduce the required signaling capacity without limiting the number
25 of combination options and the selection thereof. This object is achieved by the method in accordance with the features of claim 1 and by the communication system having the features of claim 10. Advantageous developments can be found in the dependent claims.

30

The invention draws a distinction between services with high and low data rate dynamics and uses a matched type of signaling for the transport format currently being used. The data rate of the data for a service can
35 fluctuate greatly and/or rapidly over time (high dynamics), or may fluctuate only a little and/or slowly (low dynamics). The data rate dynamics

correspond to the differential of the data rate change over time.

No joint signaling for all services takes place, but
5 instead signaling which can be individualized; in this
case, the services having different dynamics are
transmitted via the available physical channels and
cannot be readily evaluated without this signaling. For
services with high data rate dynamics, in-band
10 signaling of the transport format is carried out, and
for services with low data rate dynamics, the transport
format is signaled in a separate channel. In-band
signaling supports the high dynamics of the data rate
change in many services by signaling newly chosen
15 transport formats at an appropriate speed, whereas
somewhat slower signaling accompanying the connection
is chosen for services with data rates which change
only slowly or to a limited extent.

20 On the basis of stipulating a combination of the
currently used transport formats for the services and
the signaling thereof, the data for the services are
transmitted via the currently available common physical
channels on the basis of the combination of the
25 transport formats and, at the reception end, are
evaluated on the basis of the signaled combination of
the transport formats.

With the same number of combination options, less
30 capacity is required for in-band signaling, since only
a portion of the services need be served constantly.

In accordance with one advantageous development of the
invention, data transmission takes place via a radio
35 interface of a radio communication system. In radio
communication systems, e.g. UMTS, the transmission
resources are particularly scarce. The number of
available frequency bands is limited, and each operator
can use only a certain portion thereof. Nevertheless,

high data rates (up to 2 Mbit/s) need to be offered for many services. The invention provides particular advantages for such a radio communication system.

- 5 A particularly flexible strategy for allocating transmission capacities to connections is made possible when a radio interface is formed by a broadband frequency channel, with signals being transmitted simultaneously in a plurality of physical channels
10 which can be separated by spread codes and additionally by time slots. By modifying the spread code or by allocating additional spread codes, the transmission capacities can rapidly be matched to the requirement. The invention is suitable both for use in FDD
15 (frequency division multiplex) mode and in TDD (time division multiplex) mode in a radio communication system.

It is also advantageous to use a monitoring channel
20 (FACH), which accompanies the connection, for the separate channel for signaling the transport format for services with low data rate dynamics. Such a monitoring channel is provided for tasks which accompany connections - connection setup and connection cleardown
25 - and can be used concurrently without additional effort. By way of example, voice transmission is a service with low data rate dynamics, with a standard data rate and "zero" being stipulated as possible data rates, for example. At the start of a connection, the
30 standard data rate is signaled, and the data rate "zero" is signaled at the end of the connection. This signaling relates to the respective data rate; setup or cleardown of the connection is not signaled in this case. The same applies for pauses in speech. In the
35 latter case, signaling in the separate channel is carried out only when the data rate for a service with low data rate dynamics changes. Constant repetition of the currently chosen transport format for this service is suppressed.

In accordance with another advantageous development of the invention, a partial information item relating to the combination of the currently used transport formats is signaled for services with high data rate dynamics, the partial information item using a binary coding having a number of places which is reduced in comparison with the total amount of the permitted combinations of all services. This information item is called a partial information item because a complete mapping specification is obtained only in connection with the signaling in the separate channel. For particularly rapid signaling, the partial information item is transmitted in each frame of the data transmission of the common physical channel. This also results in a very rapid change in the chosen combination, which is limited only by any scrambling of the data over a plurality of frames which is carried out.

The signaling according to the invention can be matched to the data rate dynamics to a greater extent if an individual signaling capacity can be set within the in-band signaling for the services. Thus, for example, the partial information item is coded and distributed over a plurality of frames (interleaving) such that the transport format of services with very high data rate dynamics can actually be recognized at the reception end after evaluation of one or two frames.

Illustrative embodiments of the invention are explained in more detail using the appended drawings, in which

Figure 1 shows a schematic illustration of a radio communication system,
Figure 2 shows a layer model of the transmission protocols,
Figures 3, 4 show data for various services mapped

onto common physical channels,
Figure 5 shows a table containing a mapping
specification for services with high
data rate dynamics, and

Figure 5 shows a table containing a mapping specification for services with high data rate dynamics, and

Figure 6 shows data transmission in frames with in-band signaling.

The mobile radio system shown in Figure 1 as an example
5 of a radio communication system comprises a multiplicity of mobile switching centers MSC which are interlinked and set up access to a landline network PSTN. In addition, these mobile switching centers MSC are connected to at least one respective device RNM for
10 controlling the transmission resources. Each of these devices RNM permits, in turn, a connection to at least one base station BS and represents means which divide services 5 into two classes on the basis of individual service data rate dynamics.

15 A base station BS can set up a connection to subscriber stations, e.g. for mobile stations MS or other mobile and stationary terminals, via a radio interface. Each base station BS forms at least one radio cell. Figure 1
20 shows connections for transmitting useful information between a base station BS and mobile stations MS. Within a connection V1, data for, by way of example, three services S (S1, S2, S3) are transmitted within one or more physical channels Phy CH, and signaling
25 information, is transmitted via a monitoring channel FACH (Forward Link Access Channel) which accompanies the connection.

An operation and maintenance center OMC provides
30 monitoring and maintenance functions for the mobile radio system or for parts thereof. The functional scope of this structure can be transferred to other radio communication systems in which the invention can be used, in particular for subscriber access networks with
35 wireless subscriber access.

In the radio communication system shown in Figure 1, both the base stations BS and the mobile stations MS are provided with data transmission means, and signaling means which

communicate with one another. The data transmission means are used for transmitting data for a combination of a plurality of services S via the currently available common physical channels Phy CH. For services S1, S2 with high data rate dynamics, the signaling means signal the transport format TF in-band, and for services S3 with low data rate dynamics, the signaling means signal the transport format TF in the separate channel FACH.

10

The layer model shown in Figure 2 shows the protocols of the radio communication system divided into three layers.

Layer 1: physical layer for describing all the functions for bit transmission via a physical medium (e.g. coding, modulation, transmission power monitoring, synchronization etc.),

Layer 2: data link layer for describing the mapping of data onto the physical layer, and monitoring thereof,

Layer 3: network layer for controlling the resources of the radio interface.

Other details can also be found in ETSI SMG2/UMTS L23 expert group, Tdoc SMG2 508/98, dated 11.16.1998, pp. 9-25 (Figure 11). Layer 3 stipulates the TFCS for a connection, while layer 2 selects a combination (of a TFC) which is signaled in-band and in a separate channel using a TF CI, as shown later.

The parameter exchange between Layers 1 and 2 supports the functions of transferring frames with data for Layer 2 via the radio interface and of displaying the status of Layer 1 to higher layers. The parameter exchange between Layers 1 and 3 supports monitoring of the configuration of the transmission in Layer 1 and generates system information relating to Layer 1.

In this case, the mapping of the data for various connections S onto a common physical channel Phy CH corresponds to the interaction of Layers 1 and 2.

- 5 In accordance with Figures 3 and 4, transport formats TF need to be signaled for currently transmitted services.

10 Figure 3 shows, as an illustration of function, a coding and multiplex unit which maps data from a plurality of data channels DCH (which each correspond to the data for a service S1, S2, S3) onto a coded common transport channel CCTrCH. In this context, mapping is a specification governing the bit pattern
15 which is to be used for entering the data into a serial data sequence. A demultiplexing/allocation means distributes the data for the coded common transport channel CCTrCH over a plurality of physical channels Phy CH. The physical channels Phy CH are thus always
20 used to transmit data for a plurality of services S1, S2, S3 in each case. A physical channel Phy CH is not allocated to one service S1, S2 or S3 alone, but rather is allocated to the coded common transport channel CCTrCH with all its services S1, S2, S3.

25 Since the reception end needs to reconstruct this mapping and needs to read the data from the physical channels Phy CH and present them again in separate transport channels DCH for the services, signaling is
30 necessary. This signaling in the form of a partial information item TFCI depicts the currently used combination of the transport formats TF for the services. Which combinations are permitted for the connection (TFCS) has been agreed for connection setup.

Figure 4 shows the mapping in a slightly modified form,
with it becoming clearer that the partial information
item TFCI need be signaled only when physical channels
Phy CH are jointly used by a plurality of services S1,
5 S2, S3. If a service S1 or S2 or S3 uses one physical
channel Phy CH

exclusively, then signaling of the partial information item TFCI can be dispensed with.

According to the invention, however, standard signaling
5 is not chosen for all services, but instead the services S are distinguished by services S1, S2 with high data rate dynamics and a service S3 with low data rate dynamics. It may be assumed that S1 and S2 are two data services, e.g. S1 is a video transmission and S2
10 is an Internet link. S3 may be voice transmission. The classification of the services into one of the two classes is stipulated at the start of a connection, but may be changed during the connection. Such a change is made if the number of services changes and hence
15 in-band signaling capacity becomes free or necessary, or if the character of a service changes in terms of the data rate dynamics.

The permitted transport formats TF are stipulated as
20 shown in Figure 5. Voice transmission is distinguished only by two data rates (basic data rate 16 kbit/s or no data transmission, or pause in speech). Four different transport formats TF are available for each of the two services S1, S2.

25 The transport format TF30, TF31 for the service S3 is transmitted separately from the physical channels Phy CH for data transmission, in a rapid monitoring channel FACH accompanying the connection. Since the
30 changes in the data rate are rather uncommon, hardly any transmission capacity is lost if the signaling takes somewhat longer.

The transport formats TF for the services S1, S2 are
35 coded in accordance with the table in Figure 5. Since a total of 32 combinations of the various transport formats TF are possible for the three services S1, S2, S3, 5 bits would be needed, in binary

representation, to code this information item. In accordance with Figure 5, however, only 4 bits are necessary, since the current

transport format TF30 or TF31 for S3 is signaled separately.

5 The 4 bits of the signaling for S1 and S2 are transmitted in-band. In line with Figure 6, within transmission of data (data) in frames together with other information, capacity is also provided for transmitting the currently chosen combination of the transport formats in the form of the partial
10 information item TFCI. In FDD mode, a frame lasts 10 ms, with bits of a pilot sequence (pilot) being used for channel estimation, bits (pc) being required for transmission power regulation, and bits being reserved for in-band signaling of the TFCI. There is then a data
15 component data containing useful information.

Error protection coding of the TFCI on 32 bits, for example, and scrambling of the useful information over a plurality of frames are not shown in Figure 6. The
20 description of the chosen transport formats applies for one transmission direction. In a connection, data can naturally be transmitted in both transmission directions (UL upward direction from the mobile station MS to the base station BS, and DL downward direction
25 from the base station BS to the mobile station MS), and different transport formats TF can be stipulated for the data rates in an entirely asymmetrical and appropriate manner.

Patent claims

1. A method for transmitting data for a combination of a plurality of services (S) via jointly used physical channels (Phy CH), in which
- a quantity of permitted transport formats (TF) is stipulated for each of the services (S),
 - a combination of the currently used transport formats (TF) for the services (S) is stipulated,
 - 10 - the services (S) are classified into at least two classes on the basis of service-specific data rate dynamics,
 - for services (S) with high data rate dynamics, the transport format (TF) is signaled in-band, and for services (SF) with low data rate dynamics, the transport format (TF) is signaled in a separate channel (FACH),
 - 15 - the data for the services (S) are transmitted via common physical channels (PhyCH) on the basis of the combination of the transport formats (TF), and
 - 20 - at the reception end, the data are evaluated on the basis of the signaled combination of the transport formats (TF).
- 25 2. The method as claimed in claim 1, in which the data transmission takes place via a radio interface of a radio communication system.
- 30 3. The method as claimed in claim 2, in which the radio interface is formed by a broadband frequency channel, with signals being transmitted simultaneously in a plurality of physical channels which can be separated by spread codes and, if appropriate, additionally by time slots.

4. The method as claimed in one of the preceding claims, in which
- 5 the separate channel (FACH) for signaling the transport format (TF) for services with low data rate dynamics is a monitoring channel accompanying the connection.

5. The method as claimed in claim 4, in which the signaling in the separate channel (FACH) takes place only if the data rate for a service (S) with low data rate dynamics changes.
- 5 6. The method as claimed in one of the preceding claims, in which the data for a plurality of services (S) are mapped onto a coded common transport channel (CCTrCH), and the data of the coded common transport channel (CCTrCH) are in turn split uniformly over a plurality of physical channels (Phy CH).
- 10 7. The method as claimed in one of the preceding claims, in which a partial information item (TFCI) relating to the combination of the currently used transport formats (TF) is signaled for services with high data rate dynamics, a partial information item (TFCI) using a binary coding having a number of places which is reduced in comparison with the total amount of the permitted combinations of all the services.
- 15 20 25 8. The method as claimed in claim 7, in which the partial information item (TFCI) is transmitted in each frame (FR) of the data transmission of the common physical channel (Phy CH).
- 30 9. The method as claimed in one of the preceding claims, in which an individual signaling capacity can be set within the in-band signaling for the services (S).
- 35 10. A communication system having data transmission means for transmitting

data for a combination of a plurality of services (S) via jointly used physical channels, where a quantity of permitted transport formats (TF) and a combination of the currently used transport formats (TF) for the services (S) are stipulated for each of the services (S), having means for controlling the transmission resources which classify the services (S) into at least two classes on the basis of service-specific data rate dynamics,

having signaling means which, for services (S) with high data rate dynamics, signal the transport format (TF) in-band, and for services (S) with low data rate dynamics, signal the transport format (TF) in a separate channel (FACH).

Abstract

Method and communication system for transmitting data for a combination of a plurality of services via jointly used physical channels

For a communication system (e.g. UMTS with CDMA radio interface), the invention draws a distinction between services with high and low data rate dynamics and uses a matched type of signaling for the transport formats currently being used. The data rate of the data for a service can fluctuate greatly and/or rapidly over time (high dynamics), or may fluctuate only a little and/or slowly (low dynamics). The data for the services are transmitted via a common physical channel, with in-band signaling being used for signaling the transport format for the services with high data rate dynamics, and with signaling in a separate channel being used for the services with low data rate dynamics.

Figure 3

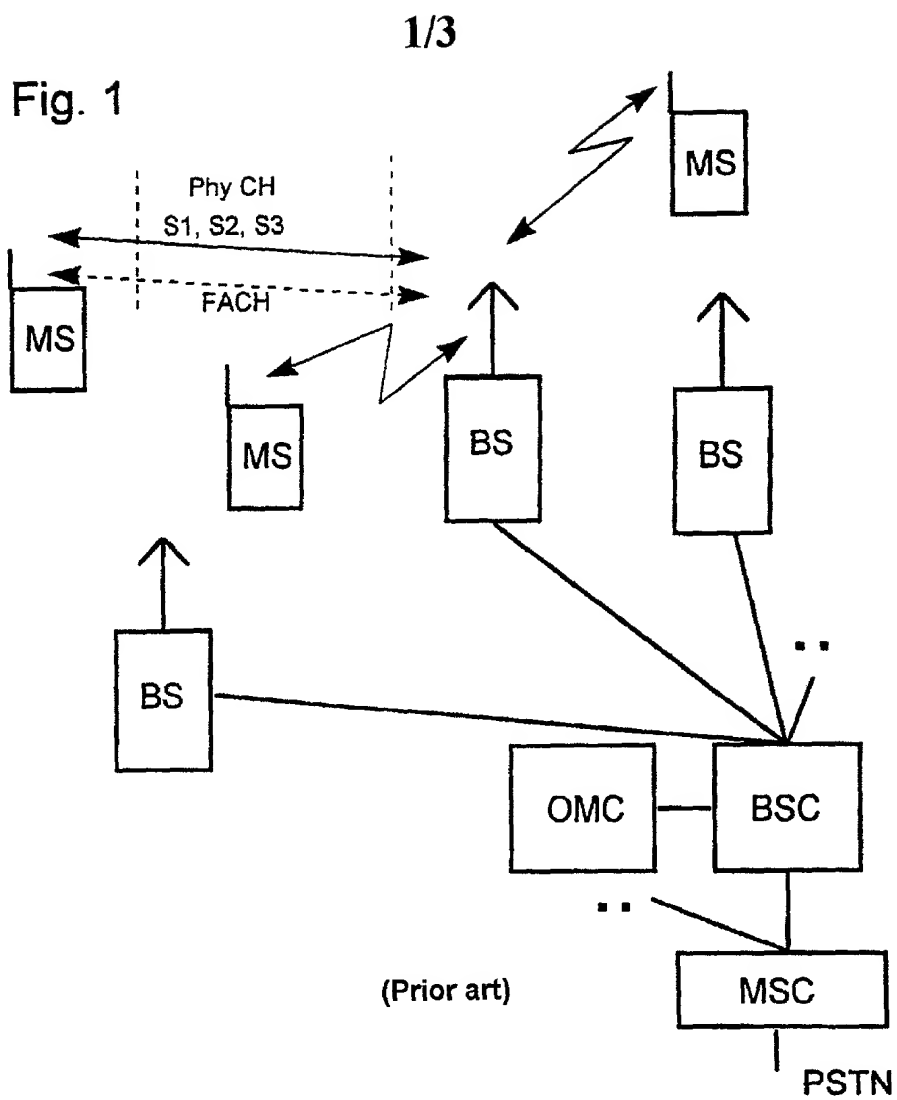
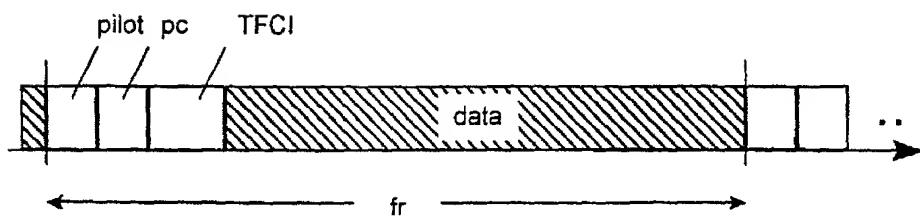


Fig. 6



2/3

Fig. 2

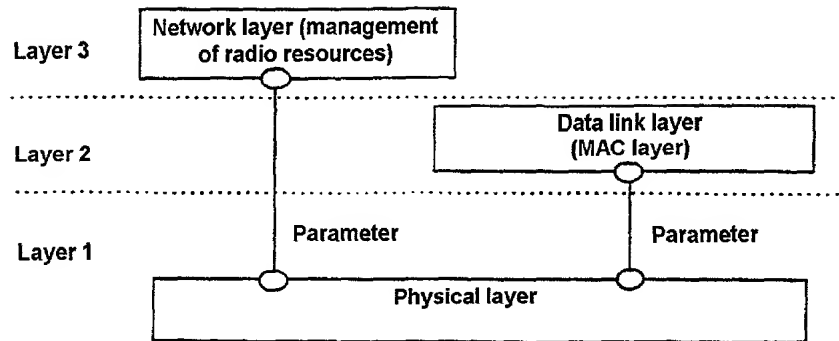


Fig. 5

TFCI	TFC
0000	TF10+TF20
0001	TF10+TF21
0010	TF10+TF22
0011	TF10+TF23
0100	TF11+TF20
0101	TF11+TF21
0110	TF11+TF22
0111	TF11+TF23
1000	TF12+TF20
1001	TF12+TF21
1010	TF12+TF22
1011	TF12+TF23
1100	TF13+TF20
1101	TF13+TF21
1110	TF13+TF22
1111	TF13+TF23

S1 : TFS1=(TF10, TF11, TF12, TF13)

S2 : TFS1=(TF20, TF21, TF22, TF23)

S3 : TFS1=(TF30, TF31)

3/3

Fig. 3

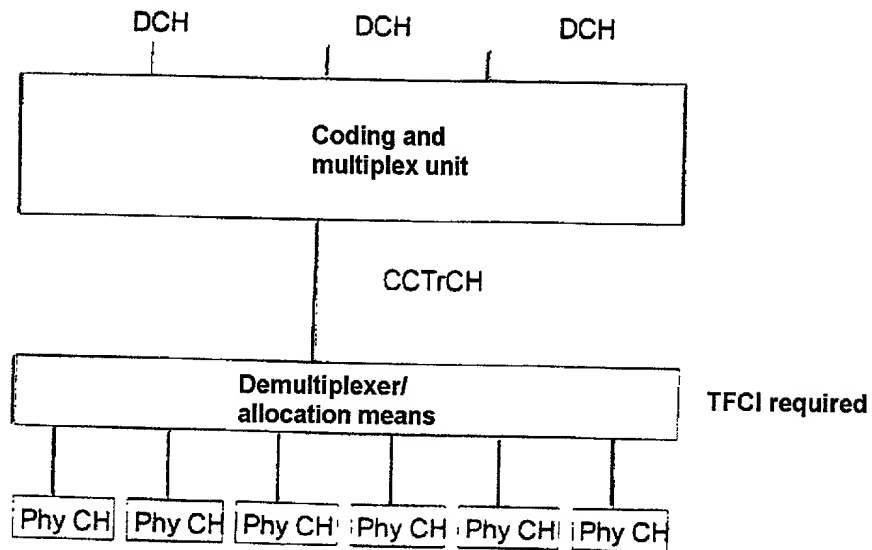
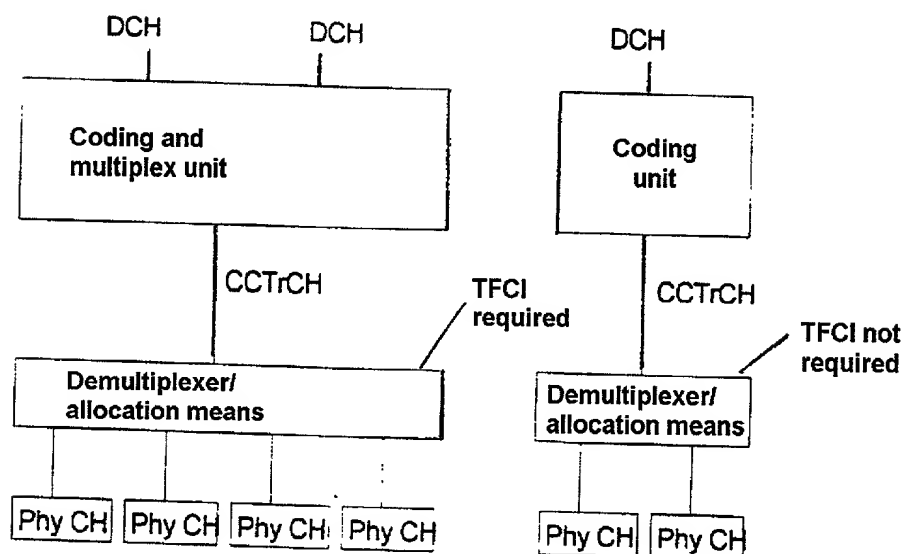


Fig. 4



Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren und Kommunikationssystem zur Übertragung von Daten einer Kombination mehrerer Dienste über gemeinsam genutzte physikalische Kanäle

deren Beschreibung

(zutreffendes ankreuzen)



hier beigelegt ist.



am _____ als

PCT internationale Anmeldung

PCT Anmeldungsnummer _____

eingereicht wurde und am _____

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obige Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)



is attached hereto.



was filed on _____ as

PCT international application

PCT Application No. _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 55 194.0 Germany

(Number)
(Nummer)

(Country)
(Land)

30. November 1998

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☒

Yes
Ja

☐

No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐

Yes
Ja

☐

No
Nein

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐

Yes
Ja

☐

No
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. Eric L. Prah, Reg. No. 32,590, Frank R. Occhiuti, Reg. No. 35,306, David L. Feigenbaum, Reg. No. 30,378, J. Robin Rohlicek, Reg. No. 43,349, Faustino A. Lichauco, Reg. No. 41,942, Paul A. Pysner, Reg. No. 40,780, Jerry D. Lentz, Reg. No. 33,945, Kenneth F. Kozik, Reg. No. 36,572, Christina Sperry, Reg. No. 47,106, Cathy Peterson, Reg. No. 41,249, Brian Colandreo, Reg. No. 42,427

Telefongespräche bitte richten an:
(Name und Telefonnummer)


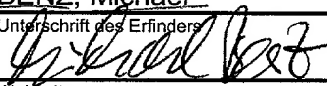
Direct Telephone Calls to: (name and telephone number)

(617) 542-5070
Ext. _____

Postanschrift:

Send Correspondence to:

FISH & RICHARDSON P.C.
225 Franklin Street
Boston, MA 02110-2804
Customer No. 26161

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
MECKLENBRÄUKER, Christoph			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
	17 Feb 2001		
Wohnsitz		Residence	
A-1220 Wien, Austria			
Staatsangehörigkeit		Citizenship	
Österreich			
Postanschrift		Post Office Address	
Langobardenstr. 126/2/23			
A-1220 Wien			
Österreich			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
BENZ, Michael			
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
	23 Jan 2001		
Wohnsitz		Residence	
D-13629 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Schuckertdamm 328			
D-13629 Berlin			
Bundesrepublik Deutschland			

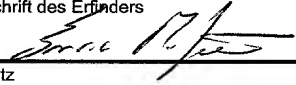
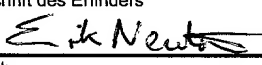

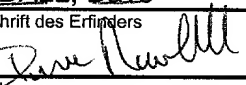
(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Voller Name des dritten Miterfinders:		Full name of third joint inventor:	
KLEIN, Anja			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Anja Klein</i>	23.2.01		
Wohnsitz		Residence	
D-10709 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Paderborner Str. 8			
D-10709 Berlin			
Bundesrepublik Deutschland			
Voller Name des vierten Miterfinders (falls zutreffend):		Full name of fourth joint inventor, if any:	
KÖHN, Reinhard			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Reinhard Köhn</i>	23.2.01		
Wohnsitz		Residence	
D-14197 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Homburger Str. 21			
D-14197 Berlin			
Bundesrepublik Deutschland			
Voller Name des fünften Miterfinders (falls zutreffend):		Full name of fifth joint inventor, if any:	
KRAUSE, Jörn			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Jörn Krause</i>	27.2.01		
Wohnsitz		Residence	
D-12107 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Freibergstr. 28-30			
D-12107 Berlin			
Bundesrepublik Deutschland			
Voller Name des sechsten Miterfinders (falls zutreffend):		Full name of sixth joint inventor, if any:	
MENZEL, Christian			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>Christian Menzel</i>	17.4.01		
Wohnsitz		Residence	
D-82216 Maisach, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Edelweißstr. 36			
D-82216 Maisach			
Bundesrepublik Deutschland			

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Voller Name des siebten Miterfinders: MITJANA, Enric		Full name of seventh joint inventor:	
Unterschrift des Erfinders 	Datum 19.4.01	Inventor's signature	Date
Wohnsitz D-81369 München, Germany		Residence	
Staatsangehörigkeit Bundesrepublik Deutschland		Citizenship	
Postanschrift Arnimstr. 21		Post Office Address	
D-81369 München			
Bundesrepublik Deutschland			
Voller Name des achten Miterfinders (falls zutreffend): NEWTON, Erik		Full name of eighth joint inventor, if any:	
Unterschrift des Erfinders 	Datum 1.5.01	Inventor's signature	Date
Wohnsitz 5 GB-Southampton S0123FZ, United Kingdom		Residence	
Staatsangehörigkeit United Kingdom		Citizenship	
Postanschrift 80 8 Foundry Lane		Post Office Address	
GB-Southampton S0123FZ			
United Kingdom			
Voller Name des neunten Miterfinders (falls zutreffend): ÖTTL, Martin		Full name of ninth joint inventor, if any:	
Unterschrift des Erfinders 	Datum 29.4.2001	Inventor's signature	Date
Wohnsitz D-82362 Weilheim, Germany		Residence	
Staatsangehörigkeit Bundesrepublik Deutschland		Citizenship	
Postanschrift Johann-Baur-Str. 16		Post Office Address	
D-82362 Weilheim			
Bundesrepublik Deutschland			
Voller Name des zehnten Miterfinders (falls zutreffend): RANDALL, Dave		Full name of tenth joint inventor, if any:	
Unterschrift des Erfinders 	Datum 1.5.01	Inventor's signature	Date
Wohnsitz GB-Romsey, Hampshire S0515SZ, United Kingdom		Residence	
Staatsangehörigkeit United Kingdom		Citizenship	
Postanschrift 8. The Timcket		Post Office Address	
GB-Romsey, Hampshire S0515SZ			
United Kingdom			

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Voller Name des elften Miterfinders: SITTE, Armin		Full name of eleventh joint inventor:	
Unterschrift des Erfinders <i>[Signature]</i>	Datum 23/02/01	Inventor's signature	Date
Wohnsitz D-10405 Berlin, Germany		Residence	
Staatsangehörigkeit Bundesrepublik Deutschland		Citizenship	
Postanschrift Prenzlauer Allee 237		Post Office Address	
D-10405 Berlin <i>DEX</i>			
Bundesrepublik Deutschland			
Voller Name des zwölften Miterfinders (falls zutreffend): TRAYNARD, Jean-Michel		Full name of twelfth joint inventor, if any:	
Unterschrift des Erfinders <i>[Signature]</i>	Datum 17.04.01	Inventor's signature	Date
Wohnsitz D-81667 München, Germany		Residence	
Staatsangehörigkeit Bundesrepublik Deutschland		Citizenship	
Postanschrift Spichernstr. 14 <i>DEX</i>		Post Office Address	
D-81667 München			
Bundesrepublik Deutschland			
Voller Name des dreizehnten Miterfinders (falls zutreffend): ULRICH, Thomas		Full name of thirteenth joint inventor, if any:	
Unterschrift des Erfinders <i>[Signature]</i>	Datum 23 Feb 2001	Inventor's signature	Date
Wohnsitz D-13505 Berlin, Germany		Residence	
Staatsangehörigkeit Bundesrepublik Deutschland		Citizenship	
Postanschrift Sandhauser Str. 109 B		Post Office Address	
D-13505 Berlin <i>DEX</i>			
Bundesrepublik Deutschland			
Voller Name des vierzehnten Miterfinders (falls zutreffend):		Full name of fourteenth joint inventor, if any:	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).